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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/583,411

06/04/2007

Hideki Fujii

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05/11/2011

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EXAMINER

JOYCE, WILLIAM C

ART UNIT

PAPER NUMBER

3656

NOTIFICATION DATE

DELIVERY MODE

05/11/2011

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentmail@whda.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/583,411	<b>Applicant(s)</b> FUJII ET AL.	
	<b>Examiner</b> William C. Joyce	<b>Art Unit</b> 3656	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2011.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2 and 6-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2 and 6-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

This Office Action is in response to the amendment filed May 3, 2011 for the above identified patent application.

#### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 2 and 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Honma (JP 09-229064).

Referring to the embodiment of Figure 8, Honma illustrates a ball spline comprising: a spline shaft having a substantially circular sectional configuration, and having in the outer peripheral surface thereof a plurality of lines of longitudinally extending arcuate torque transmission grooves (7) arranged at equal intervals, with the ball rolling faces being formed on side surfaces of land parts situated in between the torque transmission grooves, such that the ball rolling faces are on both sides in the width direction of each torque transmission groove; and a spline nut formed substantially as a cylinder with a hollow hole into which the spline shaft is fitted, having on an inner peripheral surface of the hollow hole a plurality of lines of load rolling faces (2) which are adjacent in the

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circumferential direction opposed to the ball rolling faces of the spline shaft; a large number of balls (9) rolling while receiving a load in the load region formed whereby the ball rolling faces of the spline shaft and the load rolling faces of the spline nut are opposed to each other; the spline nut has first ball retaining portions (53), formed of synthetic resin, which are protruded from the inner peripheral surface of the spline nut, each of the first ball retaining portions is accommodated in the torque transmission groove, and is disposed between a pair of rows of balls rolling on the ball rolling faces on both sides of each of the torque transmission grooves; the spline nut has second ball retaining portions (16), formed of synthetic resin, the second ball retaining portions formed into part of the inner peripheral surface of the spline nut, the first ball retaining portion and the second ball retaining portion are disposed on both sides of the load rolling faces of the spline nut; the spline nut has an endless circulation path for circulating balls, and the balls arranged in a row on a coupling belt (70) formed of a flexible synthetic resin to be inserted into the endless circulation path together with the coupling belt, guide grooves for guiding the coupling belt are axially formed in the first ball retaining portions and the second ball retaining portions.

Honma does not teach the width of the lands being sized such that the distance between a pair of rows of balls rolling on the ball rolling faces situated on both sides of each of the land parts is set larger than the distance between a pair of

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rows of balls rolling on the ball rolling faces on both sides of each of the torque transmission grooves.

It would have been an obvious matter of design choice to increase the width of each land illustrated by Honma such that the distance between a pair of rows of balls rolling on the ball rolling faces situated on both sides of each of the land parts is set larger than the distance between a pair of rows of balls rolling on the ball rolling faces on both sides of each of the torque transmission grooves, since applicant has not disclosed that the claimed spacing of the balls solves any stated problem or is for any particular purpose, and it appears that the invention would work equally well with either a small land width or a large land width.

3. Claims 2 and 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Honma (JP 09-229064) in view of Komata (JP 06-241228).

As described above, Figure 8 of Honma illustrates a ball spline having the same structural arrangement as defined by the claims, except for the spacing of the balls such that the distance between a pair of rows of balls rolling on the ball rolling faces situated on both sides of each of the land parts is set larger than the distance between a pair of rows of balls rolling on the ball rolling faces on both sides of each of the torque transmission grooves.

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The prior art to Komata illustrates (Fig. 2) a roller spline comprising: a spline shaft (1) having a plurality of lines of rolling faces extending in a longitudinal direction; and a spline nut (5) formed substantially as a cylinder with a hollow hole into which the spline shaft is fitted, having on an inner peripheral surface of the hollow hole load rolling faces opposed to the rolling faces of the spline shaft, and being assembled to the spline shaft through a large number of rollers (21), and in that the spline shaft has a substantially circular sectional configuration and has in its periphery a plurality of lines of longitudinally extending torque transmission grooves arranged at equal intervals, with the rolling faces being formed on side surfaces of land parts situated between the torque transmission grooves, that is, on both sides in the width direction of each torque transmission grooves; and the distance between a pair of rows of rollers rolling on the rolling faces situated on both sides of each of the land parts is set larger than the distance between a pair of rows of rollers rolling on the rolling faces on both sides of each of the torque transmission grooves.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the width of each land disclosed by Honma, such that the distance between a pair of rows of balls rolling on the ball rolling faces situated on both sides of each of the land parts is set larger than the distance between a pair of rows of balls rolling on the ball rolling faces on both sides of each of the torque transmission grooves, as taught by Komata, motivation being

to provide a smooth operating bearing device with a particular operating capacity for a particular application.

4. Claims 2 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Teramachi (USP 4,127,309) in view of Komata (JP 06-241228).

Teramachi teaches a ball spline comprising: a spline shaft (8) having a substantially circular sectional configuration, and having in the outer peripheral surface thereof a plurality of lines of longitudinally extending arcuate torque transmission grooves (9) arranged at equal intervals, with the ball rolling faces being formed on side surfaces of land parts (24) situated in between the torque transmission grooves, such that the ball rolling faces are on both sides in the width direction of each torque transmission groove; and a spline nut (12) formed substantially as a cylinder with a hollow hole into which the spline shaft is fitted, having on an inner peripheral surface of the hollow hole a plurality of lines of load rolling faces which are adjacent in the circumferential direction opposed to the ball rolling faces of the spline shaft; a large number of balls (6) rolling while receiving a load in the load region formed whereby the ball rolling faces of the spline shaft and the load rolling faces of the spline nut are opposed to each other.

Teramachi does not disclose a distance between a pair of rows of balls rolling on the ball rolling faces situated on both sides of each of the land parts is set larger

than the distance between a pair of rows of balls rolling on the ball rolling faces on both sides of each of the torque transmission grooves.

The prior art to Komata illustrates (Fig. 2) a roller spline comprising: a spline shaft (1) having a plurality of lines of rolling faces extending in a longitudinal direction; and a spline nut (5) formed substantially as a cylinder with a hollow hole into which the spline shaft is fitted, having on an inner peripheral surface of the hollow hole load rolling faces opposed to the rolling faces of the spline shaft, and being assembled to the spline shaft through a large number of rollers (21), and in that the spline shaft has a substantially circular sectional configuration and has in its periphery a plurality of lines of longitudinally extending torque transmission grooves arranged at equal intervals, with the rolling faces being formed on side surfaces of land parts situated between the torque transmission grooves, that is, on both sides in the width direction of each torque transmission grooves; and the distance between a pair of rows of rollers rolling on the rolling faces situated on both sides of each of the land parts is set larger than the distance between a pair of rows of rollers rolling on the rolling faces on both sides of each of the torque transmission grooves.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the number of grooves formed in the spline shaft of Teramachi with only three rolling bearing grooves spaced about the outer



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surface of the spline shaft, as taught by Komata, motivation being to minimize the manufacturing cost of the device while providing a predetermined operating capacity for a particular application.

Teramachi does not disclose the ball holders formed of synthetic resin. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the ball holders of Teramachi from synthetic resin, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

### ***Response to Arguments***

5. Applicant's arguments with respect to claims 2 and 6-10 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Joyce whose telephone number is (571) 272-7107. The examiner can normally be reached on Monday - Thursday 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on (571) 272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/William C. Joyce/  
Primary Examiner, Art Unit 3656